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Procedia Economics and Finance 3 (2012) 672 – 680

Procedia Economics and Finance

www.elsevier.com/locate/procedia

Emerging Markets Queries in Finance and Business

The influence of quality tools in human resources management

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Abstract

Within organizations, quality tools are generally used in production to solve problems or to prevent them, but for human resources management these tools are used more rarely or avoided completely. This paper aims to present a study for the usage of these tools to find the causes of production problems, caused in this case, by the human factor, namely to be a support in solving these problems and generate solutions to remedy them by supporting and helping staff to improve performance. Many problems of human resource management are solved using the technical, conceptual and native skills of the managers. However, if the manager's decisions are based on actual data that are analyzed by efficient techniques and tools, a higher success and better results can be achieved compared with the situation of neglecting or avoiding using them.

Keywords: quality, quality tools, human resources, human resources management

1. Introduction

The progressive unification of the global market in the last quarter of a century presupposes the harmonization of some cultures, structures and different policies. HR management has not always considered these facts. However, lately there's been a change from this perspective with the focus now shifting towards the specific objective to train personnel that is up to the challenges of an international career.

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doi:10.1016/S2212-5671(12)00213-4

At the beginning of the 20th century, as a result of the publication of some valuable papers in the field and under the influence of the Japanese management, there was a reconsidering of the human factor in view of adapting the national cultural specificity as each country is unique in its own way. By analyzing the Japanese competitiveness, it can be seen that the particularities of the Japanese culture are at the basis of the superiority of companies led by Japanese managers. There have been many attempts to imitate Japanese practices but without much success and this has been mainly due to neglecting the particularities of management practices that are not culture-specific Nicolescu, 1998. Specialists have reached the conclusion that there is no universal rule in management every society must develop its own conception on the matter. The differences arise from the fact that work efficiency depends on the competitive characteristics of the specific activity fields as well as the cultural environment where the enterprise functions. It is not enough to study these differences from one area to another but a thorough analysis on industry branches, companies, departments, work posts, work groups must be made so as to identify what influences management in general and HR management in particular Hermel, 1993.

2. Theoretical foundations

2.1. Quality management and HR management

Starting with the ’80s Western enterprises and especially the American ones understood two aspects that had been neglected until then:

- The importance of quality Juran, 1992 and customer satisfaction for the success of the enterprise;
- The necessity to consider quality not only as sole objective but as a management objective.

The successful application of Quality Management (QM) requires a cultural change within the organization, a change of values, an improvement in the organizational structure, in the way people work together, as well as in the way people feel about participation and involvement. Such preoccupations are at the core of the HR function. In other words, application of a QM strategy cannot work unless the human resources of the organization are involved. The standard ISO 9000:2000 emphasizes that the company management must improve the effectiveness and efficiency of the organization and its QM system by involving and obtaining support from the staff Blaga, 2002. Organization and management of human resources in such a way as to yield maximum results by making the most of their potential represent the bases of QM within an organization.

2.2. Quality instruments

In the '50s Japan started to apply certain statistical instruments to measure and control quality. Progress in continuous quality improvement was due to using these instruments and techniques. Professor Kaoru Ishikawa was the one who extended their use in his country in the '60s, thus coining the expression *quality control instruments* Ishikawa, 1985. These instruments can be generically described as being *“methods of continuous improvement and problem-solving”*. They consist in graphic techniques that aid in the process of understanding of work processes in organizations. The success of these techniques stems from the proven capacity for application in a wide assembly of problems ranging from quality control to production areas, marketing and administration. These techniques can be used by people with medium training and thus they serve as bases for problem-solving strategies in quality circles and, generally in work teams that search for improvement of activities and processes.

2.3. HR management and communication

At organization level and especially in the HR management communication is one of the most difficult aspects of managers' work. Communication skills are needed in the organization in order to integrate information received and transmit new information. Following the research carried out it was established that the openness to communication is directly linked to organizational efficiency Pace and Faules, 1994, and open communication between managers and their staff is essential for organizational climates Armstrong, 1995. Within organizations an important role is played by internal communication. This comprises the assembly of communication acts that occur inside an enterprise, the means to achieve it varying depending on the organization. In-company communication has as main objectives: the transmission of information, knowledge, tasks; the presentation of results, balance sheets, a new method, etc. Communication is the means by which unity is conferred to the entire activity in an enterprise. The main objectives of internal communication are:

- to ensure a good internal information flow;
- to make each of the managerial functions operational;
- to motivate staff; communication makes it possible to identify, know and correctly use different types of needs and incentives to maintain employee' satisfaction;
- within working groups to amplify the relationships among the members by developing an internal climate based on trust and appurtenance to the group, consolidating group cohesion and representing the basis for efficiency in group work;
- for personnel policies inside an organization, communication contributes to the positive unfolding of recruitment, selection, evaluation, improvement and promotion of personnel;
- in order to increase performance, communication contributes through feedback.

Internal communication has certain particularities relating to the role, purpose and objectives within an organization, depending on the company framework, structure and context of its organizational culture Boneau, 1990.

3. Quality instruments and participative management

This study was carried out within the company SC Allcolors Serv Ltd from Romania, national leader in the field of electrostatic field painting. The company has dealt with a series of difficulties following the rejection by external beneficiaries of some product lots that were made. These difficulties were caused by the appearance of a series of nonconformities as a result of the lack of quality in the execution of various stages of paint application. In view of eliminating and preventing future occurrences of such situations, the top management has decided to rethink the quality strategy and policy by starting a series of actions sustaining a mentality change of the employees.

3.1. Brainstorming

To solve quality problems that appeared in the production process and not only, inside the company there are different methods and working instruments used, all of them building on the professional background of the people involved in the respective processes. Presentation and debate of such situation takes place in brainstorming meetings organized as frequently as needed. Such a brainstorming meeting was dedicated to identification of situations where nonconformities arise in production and to its resolution. The brainstorming meeting was carried out taking into account the rules that are specific to hosting such a meeting, namely:

- A group of people from different departments was united in order to make the participation heterogeneous to ensure spontaneity and diversity of ideas expressed.

- The chairman of the meeting launched a number of ides in order to create an atmosphere of collaboration, dynamics, raising colleagues' interest and obtaining a chain-reaction to express ideas.
- The moment of hosting the meeting was selected in such a manner that participants could participate and communicate easily about the situations that were the object of the meeting.
- The climate was quite relaxed, permissive of discussions and launching ideas without drawing conclusions or making interpretations.

Examples can be given of ideas launched in the brainstorming meeting in the company, all being in connection with the problem formulated at the beginning of the meeting, respectively *fixing the flaw regarding the intense luster of the layer of paint.* In the following is a selection of ideas launched: changing the type of paint; changing the supplier, increasing the polymerization temperature; applying a thicker layer of paint, increasing the concentration of chemical treatment baths; recalibrating the measurement and control devices; painting with another type of blow holes on the paint sprayer. All these ideas were later analyzed and based on them proposals were made in a new meeting that took place within the company management. Thus the conclusion was reached that in order to solve the problem of the luster on the paint layer the solution is to increase the polymerization temperature over the one recommended by the producer of the paint, respectively over 190^0 C, with the mention that this action should be made gradually by five degrees per each increase. This idea was also recommended and sustained by the Production Manager and was applied. It was noted that at the temperature of 225^0 C, the paint luster fit the limits required by the client, 15-25 gloss units, proven by the results of measurements performed, thus eliminating the flaw caused by this issue.

3.2. Histogram

In order to present the elements on which must be intervened to improve the quality results of painting customers' products in the brainstorming meeting it was considered that to analyze quality in detail classic instruments of QM need to be applied. One of the elements that allows for an analysis of information about the quality of painting is the frequency histogram. Thus the situation was monitored by taking a series of measurements on successive lots of painted materials in the production area, respectively in the lab. After the data was collected the first results were obtained by systematizing them in the *Chart to register the frequency of flaws* (Table 1):

Table 1. Chart to register the frequency of flaws

Intervals	Interval limits	Interval average	Frequency Lot: 196	Frequency Lot: 197	Frequency Lot: 202	Frequency Lot: 205
1	18-22	20.0	0	0	0	4
2	22-23	22.5	0	0	0	10
3	23-24	23.5	0	0	0	8
4	24-25	24.5	2	1	2	5
5	25-26	25.5	7	0	3	0
6	26-27	26.5	5	0	3	0
7	27-28	27.5	1	0	5	0
8	28-29	28.5	2	1	2	0
9	29-30	29.5	6	1	0	0
10	30-31	30.5	3	6	4	0
11	31-32	31.5	1	4	3	0
12	32-n	(32-n)/n	0	14	5	0
Total	-	-	*27*	*27*	*27*	*27*

To visualize the flaw in the luster on the layer of paint it is necessary to construct a histogram, the most appropriate one being the asymmetric frequency histogram (Gherghel, 2000). Across the horizontal axis Ox the studied luster degree is presented, the optimum being in the interval between 24-25, an interval over which all other values are outside the permissible tolerance range. On the Oy axis the frequency of flaws is represented for each lot, varying from 0 to 14 (Fig.1).

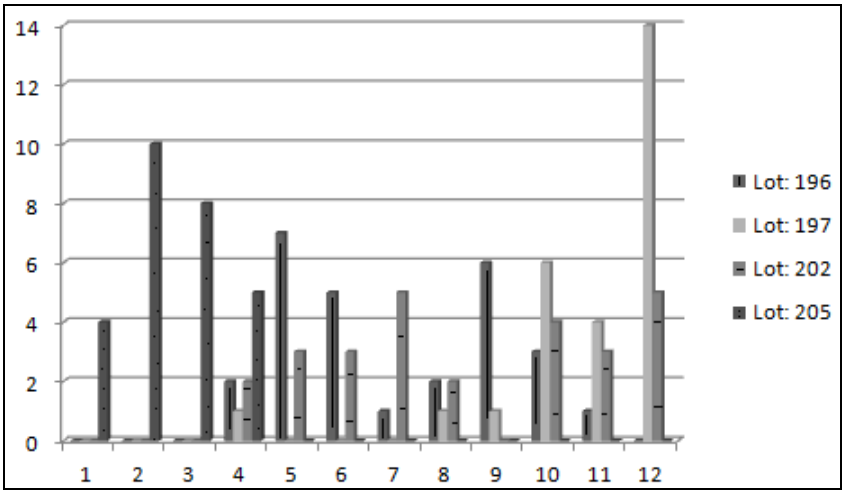

Fig.1. Asymmetrical frequency histogram

By analyzing the histogram we may conclude that the decision made within the quality circle was a correct one. This is largely due to the participative management applied by the company management by encouraging all the parties involved in the identification and solution-finding process, as well as by the way in which information, ideas, calculations are transmitted, respectively the internal communication used efficiently at all levels. These aspects have led to the desired result to eliminate nonconformities.

3.3. Pareto Chart

It was seen that a single cause can generate a high number of flaws and most of the non-quality costs. In order for these aspects to be highlighted, the Pareto chart was used, an instrument that allows for representation in graphic form of the flaws and their ranking according to importance. The study of this diagram enables an analysis and interpretation of flaws. To make the application efficient in the beginning flaws were analyzed that are the most frequent, identifying for every flaw type the causes that created them.

Table. 2. Summative table

Flaw category	Causes
A – intense luster of the applied paint layer	Low polymerization temperature
B – inappropriate thickness of paint layer	Application of wrong amounts of paint
C – foreign bodies on the surface of the paint layer	Contaminated paint or working environment
D - irregularities on the painted surface	Non-uniform application of paint on the surface
E – scratches on the painted surface	Improper handling of painted product
F – mechanical deformation of painted parts	Faulty packaging and transportation

In the case of graphic representation of the Pareto chart on the ordinate we represent the flaw category and on the abscissa the share of flawed parts in the total of parts made:

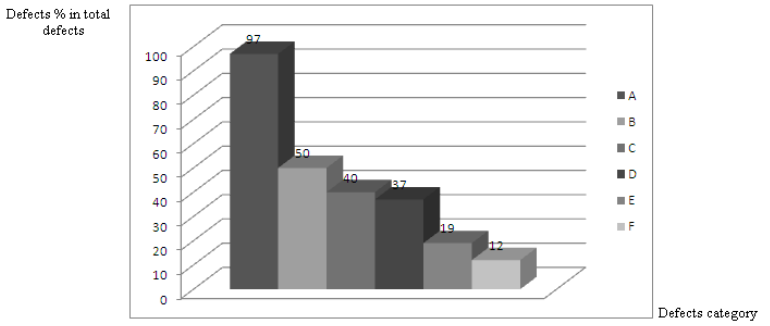

Fig.2. Pareto Chart – flaws

To collect the data presented in Table 2 and to analyze the information resulting from the Pareto chart (Fig.2.) a collaboration of specialists was necessary from the departments: production, quality, financial, technical and logistics. This would not have been possible had there not been efficient communication among the listed departments, respectively the personnel working within the same department.

3.4. Ishikawa-Fishbone diagram

To solve the problem causing the nonconformity in the brainstorming meeting the necessity to use a cause-and-effect diagram was emphasized together with the asymmetric frequency histogram.

By using the diagram (Fig.3.) factors were highlighted and ranked that can cause the occurrence of the analyzed flaw, respectively the bright luster of the paint, the effects leading to the evolution in the level of parameters that characterize the process analyzed:

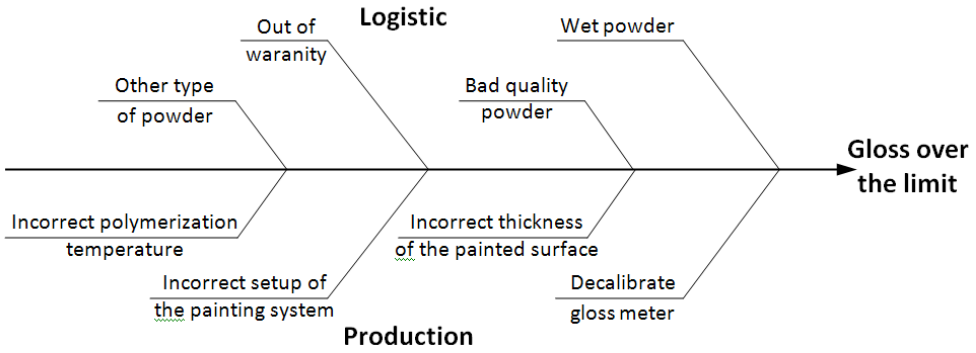

Fig. 3. Cause-and-effect diagram (Ishikawa-Fishbone diagram)

In the brainstorming meeting more hypotheses were formulated referring to the source of the flaw. They were grouped in two categories: causes relating to the raw materials used in the painting process, the paint itself

and causes that relate to the technological process, each having a minimum of 4, respectively 5 presupposed causing factors for the analyzed flaw.

Though it does not provide the needed solution, the diagram permitted a clear definition of the problem, respectively the identification of the field of expected causes that could cause the nonconformity. In this case the high volume of information needed to make the diagram was obtained by communication and by cooperation of the specialized personnel belonging to different departments. In a similar manner other quality instruments were highlighted: the correlation diagram (Fig.4.); control graph (Fig.5.); data layering.

Regardless of the quality instrument referred to, the use involves cooperation of all parties involved and presupposes maximum efficiency in collaboration and internal communication in the company, the final goal being common and well-defined.

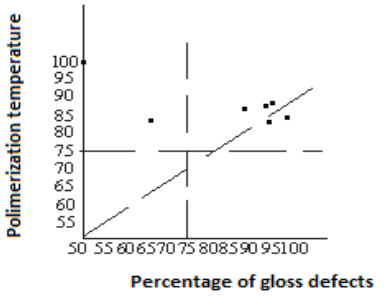

Fig.4. The correlation diagram

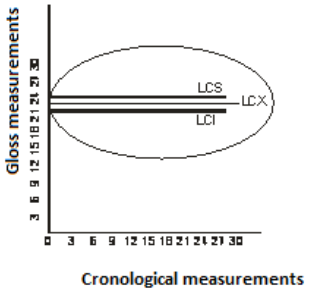

Fig.5. Integrated control graph

3.5. Relations diagram

In Beside the classic instruments used to solve quality problems, modern instruments were used to identify problems, respectively to determine the generating causes – relations diagram and tree diagram; identification of solutions for arising situations; matrix diagram and the tree; elaboration of a problem-solving program based on proposed solutions – decision-making diagram and arrow diagram (PERT).

To signal and analyze nonconformities a heterogeneous group of people were asked to attend a meeting. The problem was named and so were the presupposed causes that generated it, in a similar manner with the brainstorming meeting, the main relations identified being cause-and-effect ones (Fig.6.).

The stages were sketched on basis of the indications and information received from the departments that are directly involved in the process of making the product, respectively in close cooperation with them:

- Description and formulation of the problem;
- Identification of causes that generated the problem and establishment of cause-effect relations;
- Highlighting relations of the same kind.

The same procedure was applied in the case of other modern quality instruments used in the company, namely: PERT arrow diagram, tree chart, diagram of affinities, matrix diagram etc.

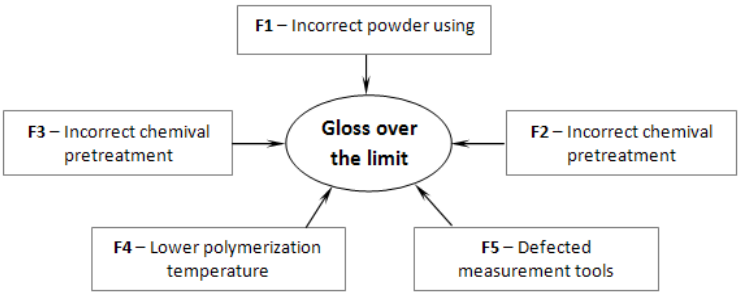

Fig.6. Relation diagram

3.6. PDPC-Process Decision Program Chart

This method was applied to establish the ways to follow to obtain expected results according the working graph, standards and norms. The method is based on sketching a tree diagram where the branch to be studied is selected and for each action the question is asked:"What could be wrong or what other alternative do we have?"

The staff involved in the project, using information and expertise according to their specialty, respectively the department's specificity, presents the set of questions, solutions and reservations, going all the way from the start of the technological process up to its end. The information is gathered and will serve in the construction of problem-solving variants.

For instance, it is considered from the arrow diagrams "Painting of Materials and Technical Quality Control: rejection of nonconformities in materials" (Fig.7):

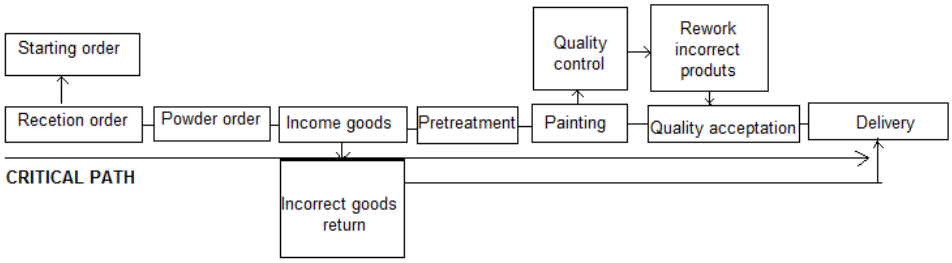

Fig.7. Process Decision Program Chart

Two options are constructed an optimistic one and a pessimistic one, arranged on two columns, mentioning the desired or undesired results, the actions that must be taken and those necessary to perform in order to alter the result, then mentioning the purpose and finally the end of the action.

Presentation of the decision program

Being an instrument to quantitative discovery and statistical revelation this instrument was used to explore the dimensions of the proposed solution to remedy the studied flaw.

To precisely define the flaw, the following questions were answered: which?, when?, where?, how?, what for?, to what extent? Based on the answers obtained the correctness of the decision made was argued using the data obtained by taking measurements and making direct observations collected during production:

Presentation table

1. *Purpose:* to demonstrate the viability and feasibility of the given solution for fixing the flaw.
2. *Unfolding:* pe during the production process of the customer order the following questions are asked:

What? - Appearance of a fabrication flaw during the work process.

Who? - Responsibility to fix the flaw is taken by:

1. Production Manager – resolving the current situation.
2. QM Department – performing measurements, analyses, making observations, drawing conclusion, making proposals, archiving and informing the Management.
3. The production staff – in collaboration with the two departments, respecting decisions made, contributing with ideas, information and observations about the studied issue.

Where? - The flaw appeared after production started.

When? - The flaw appeared after painting the customer's material.

How? - During inter-phase control, respectively by the beneficiary after delivery.

Why? - The problem appeared due to improper temperature.

How much? - The time and investment needed to fix the flaw was the least expensive and the cheapest and the fastest as compared to other solutions.

4. Conclusions

The research performed by us proves that without inter-departmental collaboration and multiple qualifications of the staff with high knowledge level as well as internal communication, clear answers for problems and non-conformities would be impossible to find in order to correct the losses generated in such case in the entire organization. It can be concluded that the study highlights the close relationship between quality instruments and HR management as they influence one another in the process of solving various problems that occur within a company.

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